

CLAIMS.

1. A method for the production of a copolymer of styrene and propylene, which method comprises copolymerising styrene and propylene in the presence of a metallocene catalyst, wherein the metallocene catalyst comprises a metallocene having either formula (I):



wherein Cp comprises a cyclopentadienyl ring; Flu comprises a fluorenyl ring; R'' comprises a structural bridge imparting stereorigidity to the component; each R is the same or different and is an organic group; m is an integer of from 0-4; each R' is the same or different and is an organic group; n is an integer of from 0-8; M is a metal atom from group 4 of the Periodic Table or is vanadium; and each Q is a hydrocarbon having from 1-20 carbon atoms or is a halogen;

or formula (II):



wherein R(FluR'_n), R'', M and Q are as defined here-above; R^s is hydrogen or a hydrocarbyl group having from 1-20 carbon atoms; X is a heteroatom from group 15 or 16 of the Periodic Table.

2. A method according to claim 1, wherein at least one group R in formula (I) is positioned on the cyclopentadienyl such that it is distal to the bridge R'', which group R comprises a bulky group of the formula ZR*₃ in which Z is an atom from group 14 of the Periodic Table and each R* is the same or different and is chosen from a hydrogen or a hydrocarbyl group having from 1-20 carbon atoms.

3. A method according to claim 2, wherein the cyclopentadienyl ring of formula (I) comprises a substituent $ZR^{\#}_3$ distal to the bridge R'' and a substituent $YR^{\#}_3$ proximal to the bridge and non-vicinal to $ZR^{\#}_3$, wherein Y is an atom from group 14 of the Periodic Table, and each $R^{\#}$ is the same or different and is chosen from a hydrogen or a hydrocarbyl group having from 1-7 carbon atoms.
4. A method according to claim 2 or claim 3, wherein Z and/or Y comprises carbon or silicon.
5. A method according to claim 1, wherein X in formula (II) is N or P.
6. A method according to claim 1 or claim 5 wherein $R^{\$}$ is tert-butyl.
7. A method according to any preceding claim, wherein the fluorenyl ring in formula (I) or formula (II) is symmetrically substituted and comprises substituents at positions 3 and 6 or substituents at positions 2 and 7.
8. A method according to claim 7 wherein the substituents are in positions 3 and 6 and are tert-butyl.
9. A method according to any of the preceding claims, wherein R'' comprises a substituted or unsubstituted ethylenyl group, an isopropylidene (Me_2C) group, a Ph_2C group, or a Me_2Si group.
10. A method according to any preceding claim, wherein M is Ti, Zr or Hf.
11. Use of a metallocene catalyst for producing a copolymer of styrene and propylene, wherein the metallocene catalyst comprises a metallocene having either formula (I):



wherein Cp comprises a cyclopentadienyl ring; Flu comprises a fluorenyl ring; R'' comprises a structural bridge imparting stereorigidity to the component; each R is the same or different and is an organic group; m is an integer of from 0-4; each R' is the same or different and is an organic group; n is an integer of from 0-8; M is a metal atom from group 4 of the Periodic Table or is vanadium; and each Q is a hydrocarbon having from 1-20 carbon atoms or is a halogen;

or formula (II):



wherein R(FluR'_n), R'', M and Q are as defined here-above; R^s is hydrogen or a hydrocarbyl group having from 1-20 carbon atoms; X is a heteroatom from group 15 or 16 of the Periodic Table.

12. Use according to claim 11, wherein the metallocene compound is a compound as defined in any of claims 2-10.

13. A copolymer, formed from styrene and propylene, obtainable according to a method as defined in any of claims 1-10.

14. A copolymer according to claim 13, which copolymer is a substantially random copolymer, or a block copolymer.

15. A copolymer according to claim 13 or claim 14, which copolymer comprises from 2 to 50 wt.% of styrene.